FORM PTO-1390
REV. 5-93

US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEYS DOCKET NUMBER
P01,0071

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)
09/763706

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP99/06239	**25 AUGUST 1999**	**25 AUGUST 1998**

TITLE OF INVENTION
SIGNALING SYSTEM OF A SIGNALING POINT

APPLICANT(S) FOR DO/EO/US **KLAUS DAVID GRADISCHNIG**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report, References).**

12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. **(SEE ATTACHED ENVELOPE)**

13. ☒ Amendment "A" Prior to Action.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☒ A substitute specification and substitute specification mark-up.

15. ☒ A change of address letter attached to the Declaration.

16. ☒ Other items or information:
    a. ☒ SUBMISSION OF DRAWINGS AND REQUEST FOR APPROVAL OF DRAWING CHANGES

    b. ☒ EXPRESS MAIL #EL655301219US dated February 23, 2001

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5) 09/763706	INTERNATIONAL APPLICATION NO. PCT/EP99/06239	ATTORNEY'S DOCKET NUMBER P01,0071

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO . . . . . $860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) . . $690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) . . . . . $710.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO . . . . . $1000.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) . . . . . $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	10	- 20 =	0	X $ 18.00	$	
Independent Claims	02	- 3 =	0	X $ 80.00	$	
Multiple Dependent Claims				$270.00+	$	
TOTAL OF ABOVE CALCULATIONS =					$ 860.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
SUBTOTAL =					$ 860.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
TOTAL NATIONAL FEE =					$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
TOTAL FEES ENCLOSED =					$ 860.00	
					Amount to be refunded	$
					charged	$

a. ☒ A check in the amount of $ 860.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-1519. **A duplicate copy of this sheet is enclosed.**

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:
SCHIFF HARDIN & WAITE
PATENT DEPARTMENT
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6473

CUSTOMER NUMBER 26574

Steven H. Noll
SIGNATURE

Steven H. Noll
NAME

28,982
Registration Number

BOX PCT

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY – CHAPTER II

REQUEST FOR APPROVAL OF DRAWING CHANGES

APPLICANT(S):	GRADISCHNIG, K.
ATTORNEY DOCKET NO:	P01,0071
INTERNATIONAL APPLICATION NO:	PCT/EP99/06239
INTERNATIONAL FILING DATE:	25 AUG 1999
INVENTION:	SIGNALING SYSTEM FOR A SIGNALING POINT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Applicant hereby requests approval of the changes, shown in red, on the three drawing sheets attached hereto, in the captioned PCT application. The changes include English translations of foreign language designations.

Respectfully submitted,

Steven H. Noll (Reg. No. 28,982)

SCHIFF, HARDIN & WAITE
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606
Telephone: (312) 258-5790
Attorneys for Applicant

Customer Number: 26574

FIG 1 - Exemplary Routing with Virtual Tunnels

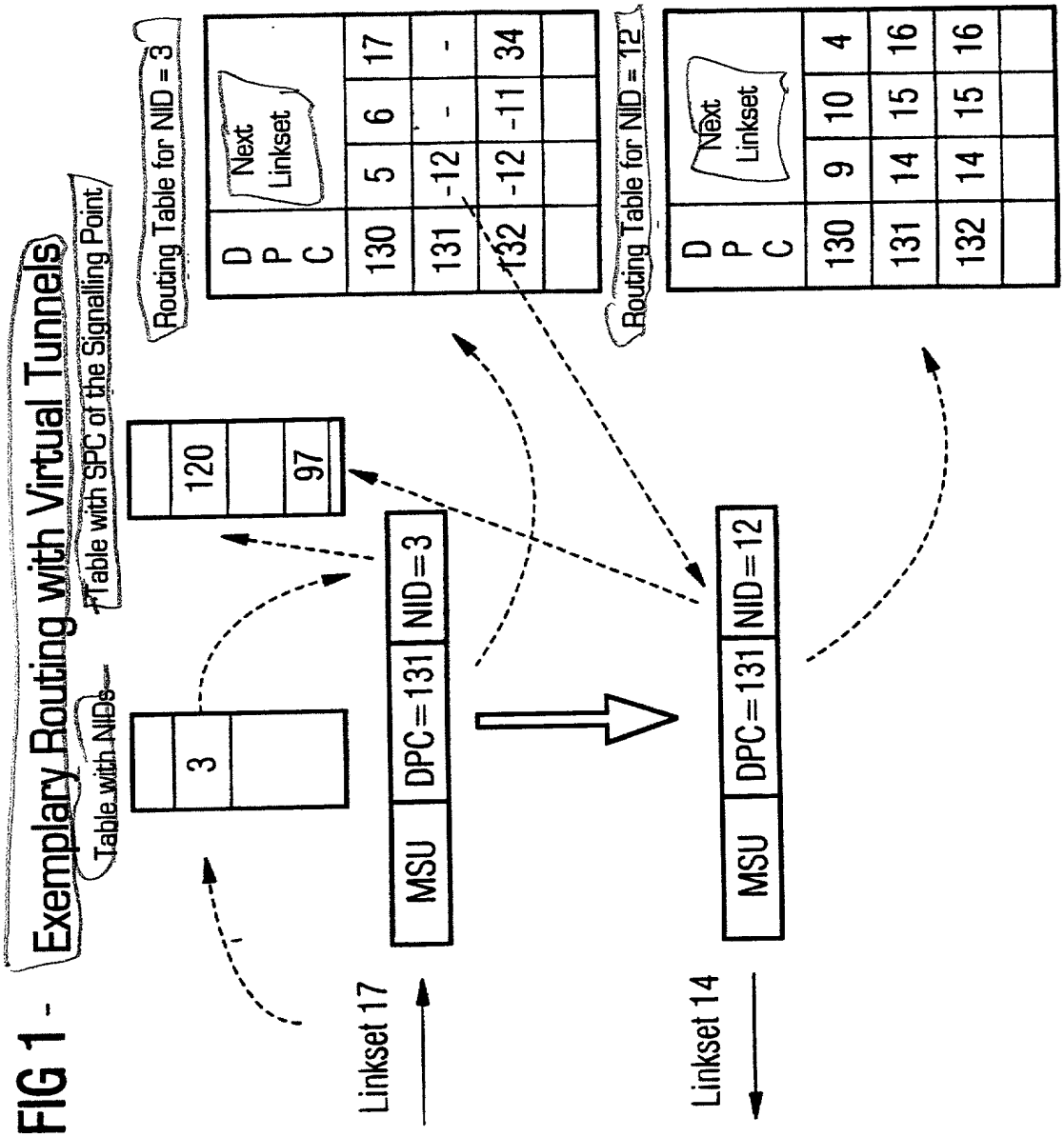


FIG 2 - Incoming Linkset/DPC Screening

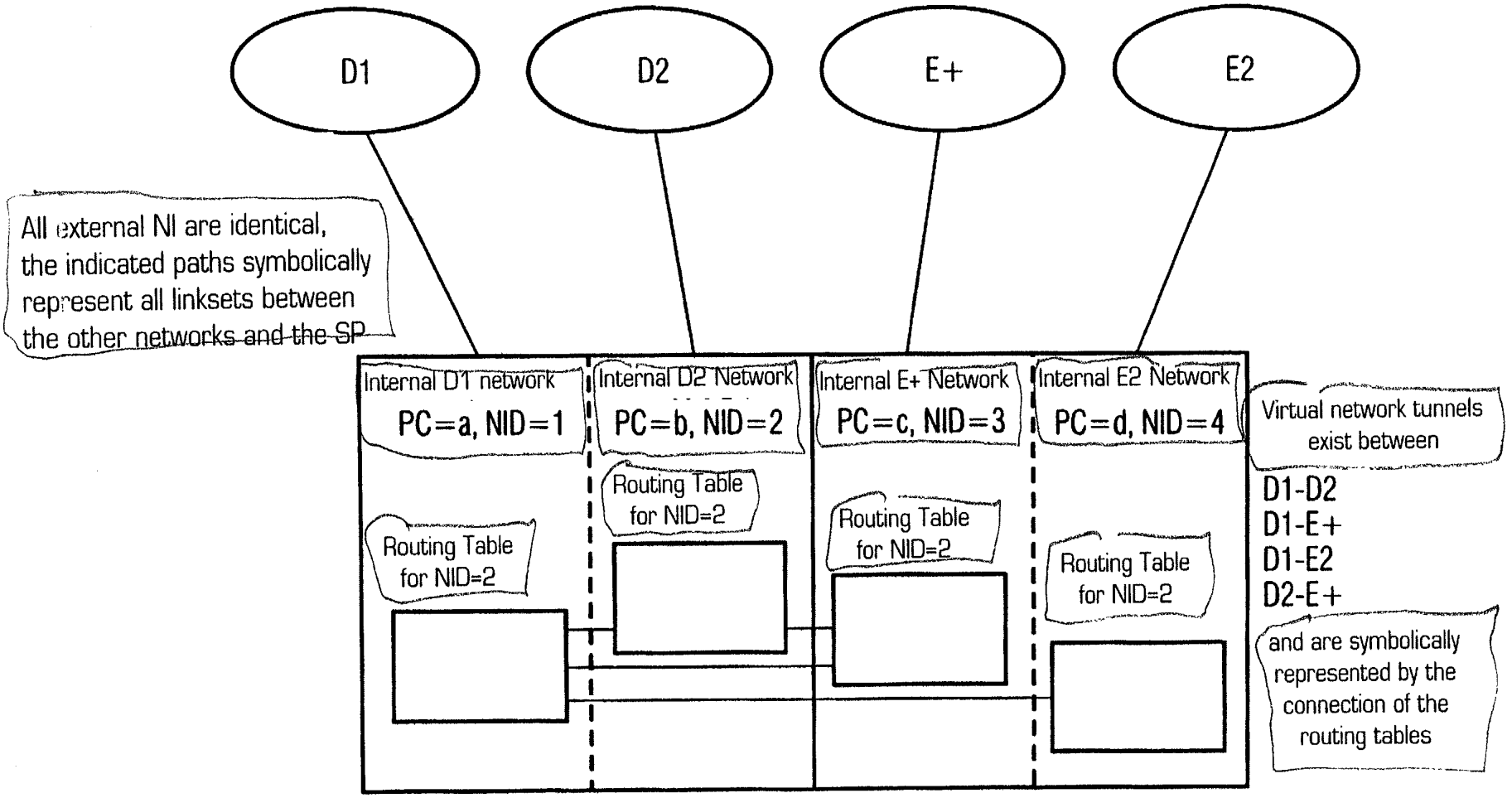
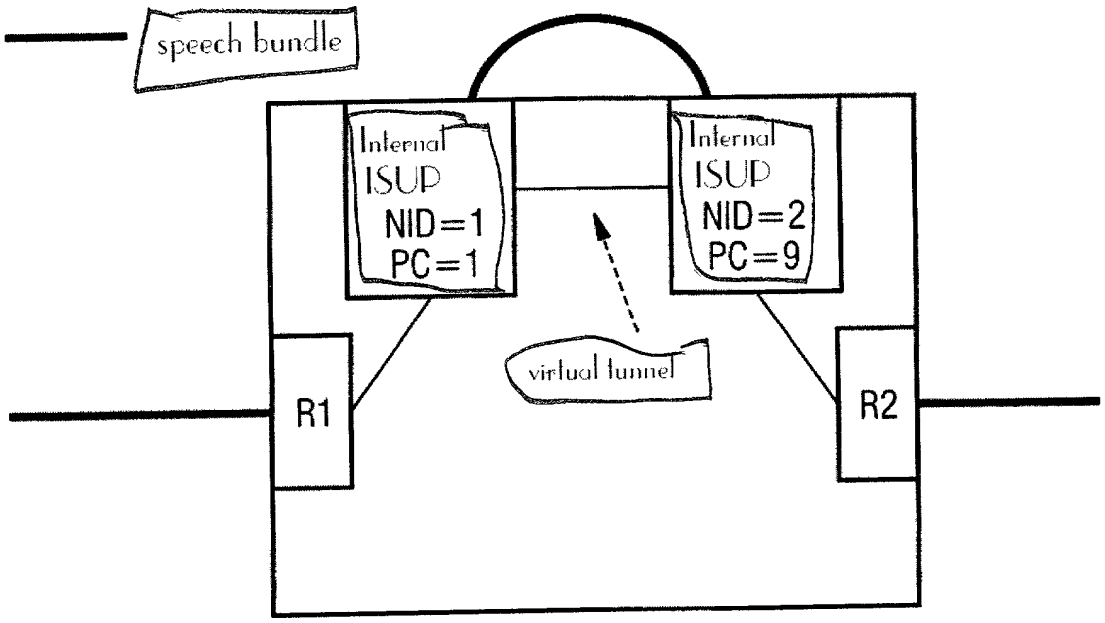


FIG 3 - Interworking of R1 and R2 via ISUP



BOX PCT

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY – CHAPTER II

SUBMISSION OF DRAWINGS

APPLICANT(S):	GRADISCHNIG, K.
ATTORNEY DOCKET NO:	P01,0071
INTERNATIONAL APPLICATION NO:	PCT/EP99/06239
INTERNATIONAL FILING DATE:	25 AUG 1999
INVENTION:	SIGNALING SYSTEM OF A SIGNALING POINT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Applicant herewith submits three drawing sheets, showing Figures 1 – 3, in the captioned PCT application.

Respectfully submitted,

Steven H. Noll (Reg. No. 28,982)

SCHIFF, HARDIN & WAITE
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606
Telephone: (312) 258-5790
Attorneys for Applicant

Customer Number: 26574

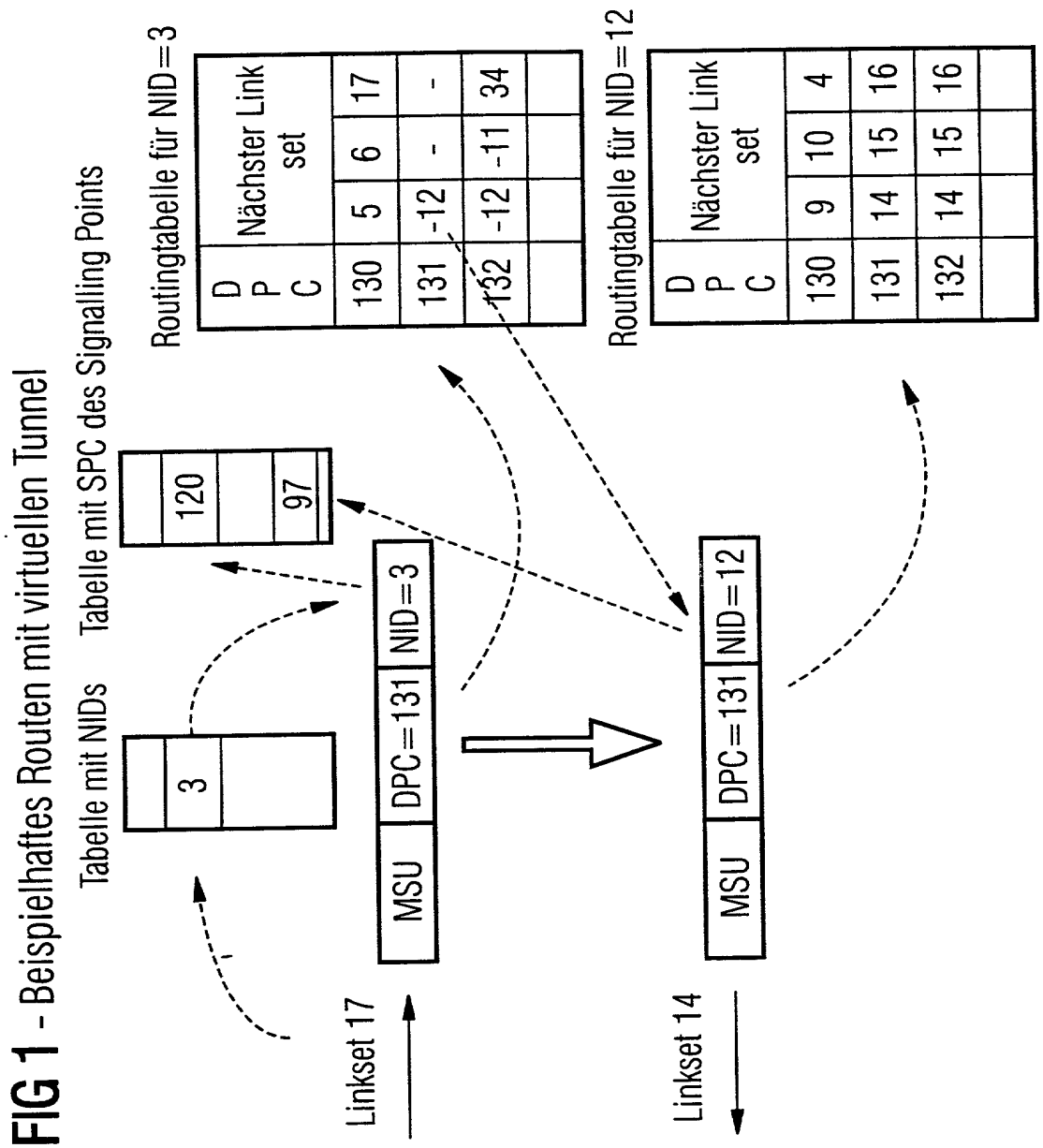
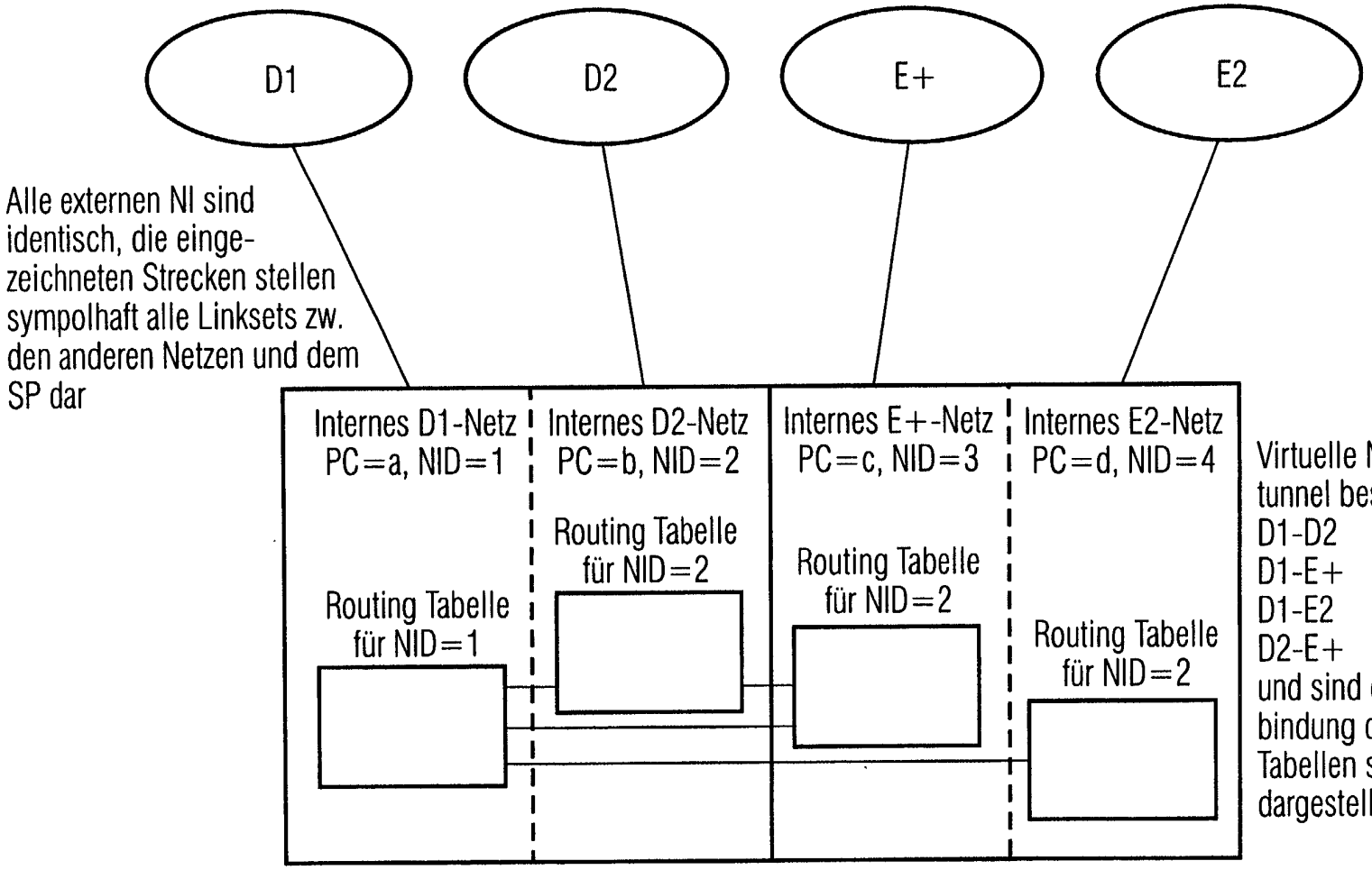


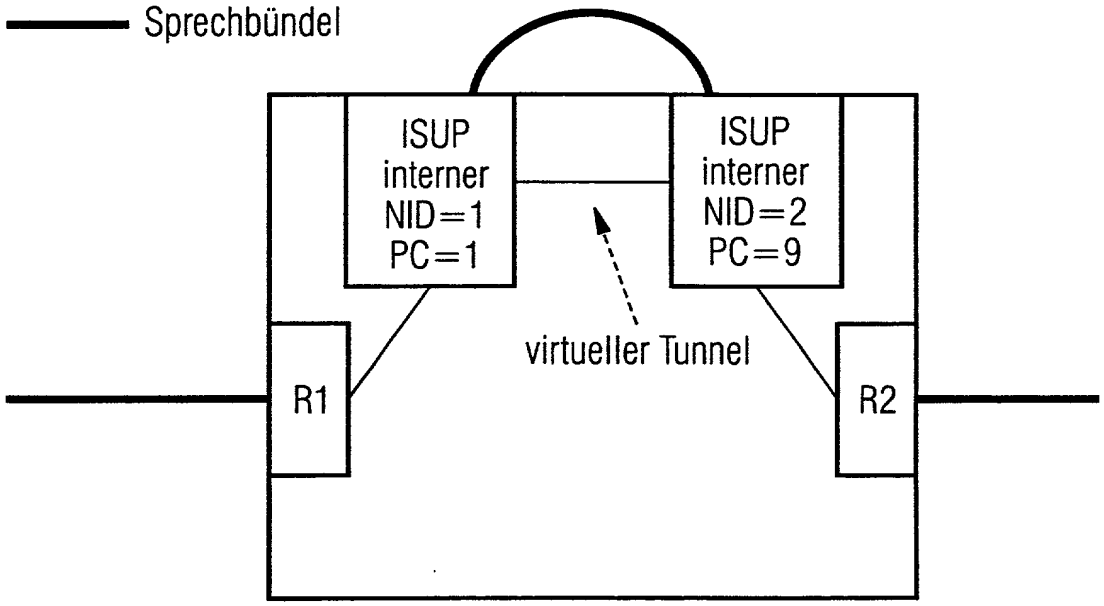
FIG 1 - Beispielhaftes Routen mit virtuellen Tunnel

FIG 2 - Incoming Linkset/DPC Screening



09/763706

FIG 3 - Interworking von R1 und R2 via ISUP



BOX PCT

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY – CHAPTER II

AMENDMENT "A" PRIOR TO ACTION AND SUBMISSION OF SUBSTITUTE SPECIFICATION

APPLICANT(S):	GRADISCHNIG, K.
ATTORNEY DOCKET NO:	P01,0071
INTERNATIONAL APPLICATION NO:	PCT/EP99/06239
INTERNATIONAL FILING DATE:	25 AUG 1999
INVENTION:	SIGNALING SYSTEM OF A SIGNALING POINT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Applicant herewith submits an amendment and substitute specification in the above-referenced pct application, and requests entry of same prior to examination in the United States National Phase.

IN THE SPECIFICATION

Cancel the specification as filed, and substitute therefore the substitute specification provided herewith.

IN THE CLAIMS

Cancel claims 1 - 10 as filed, and insert therefore new claims 11 - 20 as follows:

- - What is claimed is:

11. A method for operating a signaling system of a signaling point, the method comprising the steps of:

determining for a received signaling message on the basis of a network identifier, the identity of a network to which the signaling message belongs;

taking from a routing table belonging to the network identity, items of information for routing of the signaling message, wherein the signaling system accesses the routing table using the signaling point code of the signaling message;

determining on the basis of the type of routing information taken from the routing table, whether an item of routing information is present indicating a link or linkset one of for forwarding the signaling message, or for denoting a network identifier; and

supplying the signaling message for the routing, if the item of routing information taken from the routing table is a network identifier.

12. The method according to claim 11, further comprising the step of:

defining the network identifier of a signaling message by the link or linkset via which the signaling message was received.

13. The signaling system according to claim 12, further comprising the step of:

indicating the network identifier of a signaling message in the signaling message itself.

14. The signaling system according to 13, further comprising the step

of:

using the cited new routing to cause the system to switch signaling messages between two different signaling systems.

15. Signaling system according claim 14, further comprising the step of:

using the cited new routing to cause the system to realize an internetworking with other networks.

16. A method for routing comprising the steps of:

determining, for a received signaling message, the identity of the network to which the signaling message belongs on the basis of a network identifier;

taking from a routing table belonging to the network identity, items of information for routing of a signaling message, wherein the routing table is accessed using the signaling point code of the signaling message;

determining on the basis of the type of routing information taken from the routing table, whether an item of routing information is present that indicates a link or linkset useful, one of, for forwarding of the signaling message, or for denoting a network identifier; and

repeating application of the signaling message to the routing, if the item of routing information taken from the routing table is a network identifier.

17. The method for routing according to claim 16, further comprising the step of:

defining the network identifier of a signaling message by the link or linkset via which the signaling message was received.

18. The method for routing according to claim 17, further comprising the step of:

indicating the network identifier of a signaling message in the signaling message itself.

19. The method according to claim 18, further comprising the step of:

using the cited new routing to switch signaling messages between two different signaling systems.

20. The method according to claim 19, further comprising the step of:

using the cited new routing to enable a network to internetworking with other networks. - -

IN THE ABSTRACT

Cancel the Abstract as filed, and insert therefore on a separate page the following Abstract of the Disclosure:

- - **ABSTRACT OF THE DISCLOSURE**

A signaling system that enables the interworking of different signaling systems via virtual network tunnels. The signaling system is operated by a method using a network identifier to identify a network to which a signaled message belongs. Items of information for routing the signaling message are taken from a routing table belonging to the network identity. The signaling message is supplied for routing if the routing information is a network identifier. - -

REMARKS

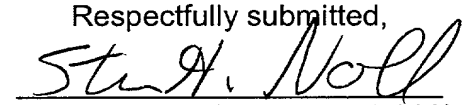
A substitute specification and a proper Abstract of the Disclosure are provided herewith which make editorial changes in order to conform to standard US practice. A marked-up copy of the specification is also provided reflecting the changes made.

In addition, the claims as filed have been canceled and replaced by new claims that more clearly set forth applicant's invention.

No new matter has been inserted into the application.

Applicant submits that this application is in proper condition for examination in the United States National Examination Stage, which action is earnestly solicited.

Respectfully submitted,



Steven H. Noll (Reg. No. 28,982)

SCHIFF, HARDIN & WAITE
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606
Telephone: (312) 258-5790
Attorneys for Applicant

Customer Number: 26574

~~Specification~~

~~Signaling system of a signaling point~~
Substitute Specification:

- - SIGNALING SYSTEM OF A SIGNALING POINT

BACKGROUND OF THE INVENTION

Field of the Invention:

~~In~~The present invention generally pertains to signaling systems, and particularly to channel-oriented signaling systems.

Discussion of the Related Art:

~~systems, for example in the signaling system~~Ordinarily, in channel-oriented signaling systems, such as the Signaling System R5, it is possible for a signaling point to communicate with ~~itself, or, respectively,~~itself or to set up a connection with itself, via a useful channel loop.

~~In the signaling system no. 7 (called ZGS7 for short in the following), this is not possible. However, such loops are~~However, in Signaling System 7, also called SS7 or ZGS7, this is not possible, although such loops would be advantageous for the solution of a plurality of ~~problems.~~ problems including the interworking of different signaling systems.

For the interworking of different signaling systems, it ~~is a significant simplification in implementation~~would be extremely expedient if all signaling systems interwork with a designated signaling system, rather than each signaling system interworking with every other. ~~Another technical problem that can be solved using similar methods is incoming linkset [or: link set] / DPC screening (see e.g. Q.705, §8).~~

In addition, technical problems associated with using similar methods, such as incoming linkset/DPC screening as set forth in protocol Q.705, §8, would also be solved.

In ~~the~~ ZGS7, a signaling point is identified by an address, called the signaling point code (SPC). If the signaling point code is used as the destination address, it is also called the destination point code (DPC). If ~~it~~a signaling point designates an originating address, it is called the origination point code (OPC).

In general, level 3 of the message transfer part (MTP) cannot send a message to its own signaling point~~code, or, respectively,~~code or cannot receive a message from itself. Certain users of the ~~message transfer part,~~MTP, for example TUP and ISUP, also normally cannot send channel-related messages to themselves, even if the ~~message transfer part~~MTP were to enable this.

In order~~nonetheless~~ to enable such loops, special methods have been implemented that consist essentially~~in the formation of loops by specific signaling channels, on which loops~~of loops specifying signaling channels on which the destination and/or sender address are ~~inverted/complemented.~~inverted or complemented. If necessary, similar user-specific modifications must be carried out for users.

Another possible solution forto this problemin systems that support the multiple network design (further explained below) would be to use what are known as physical network tunnels. In order to realize such a physical tunnel, a link (known as a loop link)tunnels, wherein a link, known as a loop link, is fed back in a loop from a signaling point to the same signaling point, and two different network identities are allocated thereto, one at the input side and the other at the output side.

However, physical tunnels have the disadvantage that their use requires additional hardware (loop links, etc.),hardware, such as the loop links, etc., and messages that must travel through the tunnel experience an additional delay.

The invention is based on the object of indicating a system that makes the network tunnel possible without the cited disadvantages.

This object is achieved by means of a system according to claim 1.**SUMMARY OF THE INVENTION**

Accordingly, it is an object of the present invention to provide a system that makes network tunneling possible.

It is a further object of the invention to provide a system that makes virtual tunneling possible.

The inventive design ofIt is another object of the invention to provide a system wherein the virtual tunnel considerably reduces additional hardware outlay and time delay, withouthowever requiring a large development expense.

~~In the following, the invention is explained in more detail with the aid of the drawing, which comprises three figures.~~These and other objects of the invention will become apparent from careful review of the following detailed description of the preferred embodiment, which is to be read in conjunction with study of the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a method according to the present invention;

Figure 2 shows forms of incoming linkset/ DPC screening according to the present invention.

Figure 3 shows an interworking of various signaling systems according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The ~~invention is explained in more~~present invention will now be described in detail on the basis of the system ZGS7, also known as Signaling System 7 (SS7). The description assumes a multiple network system that supports 32 MTP networks.

~~ZGS7.~~

In the ZGS7, a network is identified by ~~what is known as an (external)~~an external network indicator ~~(NI) that~~NI, which is contained in~~the~~ externally observable messages.

In the messages, two bits are reserved for the ~~NI; therefore.~~NI. Therefore, up to four networks can be distinguished in a node. ~~Since normally a~~Although a normal signaling link belongs to only one network, it ~~has however come to be recognized that in order to~~is possible to sufficiently distinguish the network ~~it is sufficient to allocate~~by allocating individual links to particular networks. Therefore, the ~~The NI is therefore~~NI is no longer required as a distinguishing feature.

In fact, there are systems– already existing or in the planning stages– that support more than four (e.g., 8 or 32) signaling networks. A network identity NID~~(networkidentifier)~~ is~~thereby~~ internally allocated to each signaling link or link set, and an NI is externally allocated to each internal network identifier NID. Networks having different internal identity can thereby use the same external NI throughout. Each ~~(internal) network is thereby internally completely separated from the other networks. (This method of the decoupling of the external NI and the internal NID~~internal network is thereby completely separated internally from the other networks. This method of the decoupling of the external NI and the internal NID is also applicable to systems that support only four or ~~is of course also applicable to systems that support only four or fewer MTP networks). The cited design is called the multiple network design in the following.~~

~~Existing or, respectively, planned systems that support the multiple network design normally route MSUs in that, from a table (routing table), the next link(set) to the desired destination that is currently to be used is determined. For each internal (logical) network, there is thereby exactly one table, and the tables of these networks are independent of one another. For these systems, a simple modification of these routing tables is now carried out such that in the routing tables the path [...] as the next to be taken can be not only a particular link(set) but also a different network.~~

~~As an exemplary embodiment of the invention, a multiple network system that supports 32 MTP networks is assumed.~~

Given an incoming MSU, the system determines the (internal) network identity (NID) of the network to which this link belongs, on the basis of the link at which the MSU arrived. In Figure 1, this process is shown for an MSU having DPC=131, which is received at a link belonging to the linkset 17. In Figure 3, NID=3 is determined as the internal NID. As the next step, on the basis of the DPC of the MSU it is determined whether the SP represents the endpoint for the MSU, that is, whether the SPC of the SP (SPC depends on the NID; in Fig. 1 it is the SPC=120 belonging to NID=3!) agrees with the DPC of the MSU, or whether the MSU must be rerouted.

If, in the manner described, the system determines that the MSU must be rerouted, the system selects, on the basis of the DPC of the MSU, a line **[or: row]** from a routing table belonging to the NID. This line contains the identities (for example, numbers) of the possible additional routes (that is, linksets), and specially designated identities (for example, the numbers -1 to -32), which now represent not linksets, but rather (the for example negative) internal NID. If during routing such a "route" is recognized (in Figure 1, the entry -12 in the routing table of the NID=3 determines the "tunnel" to the network having NID=12 as the next path for the DPC 131), the NID of the MSU is correspondingly modified, and is supplied again to the routing, but this time in the other network, which means that the system again determines, on the basis of the DPC of the MSU, whether the SP represents the endpoint for the MSU, and, if not, takes information for the routing of the MSU from a routing table belonging to the NID (see Figure 1; the SPC belonging to NID=12 is 97, and the next path of the MSU travels via linkset 14). Of course, network management messages are also routed correspondingly.

With the exception of the production of test traffic and actual physical loops, using virtual tunnels all problems can be solved that can also be solved using the physical tunnels.

In Figure 2, as an example it is shown how, using the present invention, certain forms, important in practice, of what is known as the incoming linkset / DPC screening can be solved. The operator of a signaling transfer point (STP) offers SS7 interconnect services to other communication network operators. In the example in Figure 2, these are the networks D1, D2, E1 and E2. According to fewer MTP networks. This design is called the multiple network design.

Existing or planned systems that support the multiple network design normally route MSUs in that, from a routing table, the next link or linkset to the desired

destination that is currently to be used is determined. For each internal logical network, there is thereby exactly one table, and the tables of these networks are independent of one another. For these systems, a simple modification of these routing tables is now carried out such that in the routing tables the next path selected can be not only a particular link or linkset but also a different network.

Given an incoming MSU, the system determines the internal network identity (NID) of the network to which this link or linkset belongs on the basis of the link at which the MSU arrived.

Figure 1 shows this process for an MSU having DPC=131, which is received at a link or linkset belonging to the link or linkset 17.

If the system determines that the MSU must be rerouted, the system selects, on the basis of the DPC of the MSU, a line or row from a routing table belonging to the NID. This line contains the identities, such as numbers, of the possible additional routes, such as links or linksets, and specially designated identities, for example, the numbers -1 to -32, which now represent not links or linksets, but rather, the negative internal NID.

If during routing, such a "route" is recognized, the NID of the MSU is correspondingly modified, and is supplied again to the routing. But this time in the other network, the system again determines on the basis of the DPC of the MSU, whether

the SP represents the endpoint for the MSU. If not, the system takes information for the routing of the MSU from a routing table belonging to the NID. As discussed with reference to Figure 1, the entry -12 in the routing table of the NID=3 determines the "tunnel" to the network having NID=12 as the next path for the DPC 131. Also with reference to Figure 1, the SPC belonging to NID=12 is 97, and the next path of the MSU travels via linkset 14. Thus, network management messages are also routed correspondingly.

With the exception of the production of test traffic and actual physical loops using virtual tunnels, all problems can be solved using the physical tunnels according to the present invention.

Figure 2 shows an example of how certain forms of an incoming linkset/ DPC screening can be solved using the present invention.

~~the agreement, the other~~The operator of a signaling transfer point (STP) offers SS7, also known as ZGS7, interconnect services to other communication network operators. In the example in Figure 2, these are networks D1, D2, E+, and E2. Other networks may make unlimited use of the STP for SS7 traffic inside their own networks. For traffic between the networks, however, there are the following limitations: E+ and D2 may communicate only with one another and with D1. E2 may communicate only with D1. In order to enforce these agreements, the operator of the STP must be able to prevent

unauthorized traffic between the networks. He can accomplish this by terminating the linksets to the different operators internally in different SS7 networks.

~~networks, as shown symbolically in Figure 1.~~

As is shown symbolically in Figure ~~[...],~~2, the internal networks are then connected by virtual tunnels, in such a way that virtual tunnels are set up only between those networks ~~between~~for which traffic is permitted. For example, for destinations (DPCs) that belong to the operator E2, no routes are set up in the routing tables for the internal networks 2 and ~~3 (corresponding to D2 and E+).~~3, corresponding to D2 and E+. In contrast, for destinations (DPC) in D1, special routes representing the virtual tunnels are for example set up in the routing tables of the internal networks 2, 3 and 4.

~~It is to be noted that the~~The limitation of the permitted traffic need not absolutely be limited only to entire ~~[or: overall]~~ networks. Rather, the routing tables can be constructed such that~~, for example,~~ traffic from E+ is possible only to particular designated destinations in D2~~,~~ by making no entries in the routing table in the network 3 for destinations in D2 that are not allowed.

In Figure 3,~~as~~ an example an interworking of various signaling systems (R1, R2, ISUP) is ~~described~~shown. An interworking is realized between R1 and ISUP and between R2 and ISUP, but not between R1 and R2. An ISUP is located both in the internal network having NID=1 and in the internal network having NID=2. Externally, both networks use for example the same NI, but use different point codes.

A call between R1 and R2 is routed via the ISUP loop. For this purpose, it is sufficient to correspondingly set up the ZGS7 routing tables in both networks, as well as the routing tables for the call processing, and to construct the required speech bundles for the ISUP loop. The ISUPs of the two internal networks communicate via the virtual tunnel (shown symbolically) between NID=1 and NID=2. A physically looped signaling link or linkset is therefore not required.

In Figure 3, NID=3 is determined as the internal NID. As the next step, on the basis of the DPC of the MSU, a determination is made whether the SP represents the endpoint for the MSU, such as whether the SPC, which SPC depends on the NID of the SP, agrees with the DPC of the MSU, or whether the MSU must be rerouted. For instance, in Fig. 1, it is the SPC=120 that belongings to NID=3.

A great advantage of the invention is that existing mechanisms (routing tables and multiple networks) can be used, at low expense, in order to provide purely virtual network tunnels, which previously were realized only physically.

The invention can also be used without the multiple network design being ~~supported, but in this case~~supported. However, the problems~~of application~~ that can be solved using the tunnel design of the present invention are limited. ~~If, for~~For example, if the flexible allocation of the external NIs to the internal NIDs is not fully supported, but ~~rather this~~ takes place in 1:1 fashion, then the specified method cannot be used for the incoming linkset / DPC screening. As the number of internal NIDs that are supported,

with otherwise flexible mapping of NI to NID, becomes fewer, the incoming linkset / DPC screening becomes~~more~~ limited in its flexibility.

Patent claims

1. Signaling system of a signaling point, that

- for a received signaling message, determines the internal network identifier (NID) of the network to which the signaling message belongs,

- takes, from a routing table corresponding to the network identifier, items of information for the routing of the signaling message, whereby it accesses the routing table using the signaling point code (DPC) of the signaling message,

- determines, on the basis of the type of routing information taken from the routing table, whether an item of routing information is present that indicates the next link(set) to be used, or that denotes a network identifier,

- again supplies the signaling message to the routing, if the item of routing information taken from the routing table is a network identifier.

2. Signaling system according to claim 1,

characterized in that

the network identifier of a signaling message is defined **[or: determined]** by the link(set) via which the signaling message was received.

3. Signaling system according to claim 1,

characterized in that

the network identifier of a signaling message is indicated in the signaling message itself.

4. Signaling system according to one of claims 1 to 3,

characterized in that

with the aid of the cited new routing, the system switches signaling messages between two different signaling systems.

5. Signaling system according to one of claims 1 to 3,

characterized in that

with the aid of the cited new routing, the system realizes an internetworking with other networks.

6. Method for routing, according to which

- for a received signaling message, the identity of the network to which the signaling message belongs is determined on the basis of a network identifier (NID, NI),

~~from a routing table belonging to the network identity, items of information are taken for the routing of the signaling message, whereby the routing table is accessed using the signaling point code (DPC) of the signaling message,~~

~~on the basis of the type of routing information taken from the routing table, it is determined whether an item of routing information is present that indicates a link or, respectively, linkset that is to be used for the forwarding of the signaling message, or that denotes a network identifier,~~

~~the signaling message is again supplied to the routing if the item of routing information taken from the routing table is a network identifier~~

~~7. Method for routing according to claim 6,~~

~~characterized in that~~

~~the network identifier of a signaling message is defined by the link or, respectively, linkset via which the signaling message was received.~~

~~8. Method for routing according to claim 6,~~

~~characterized in that~~

~~the network identifier of a signaling message is indicated in the signaling message itself.~~

~~9. Method according to one of claims 6 to 8,~~

~~characterized in that~~

~~the cited new routing is used in order to switch signaling messages between two different signaling systems.~~

~~10. Method according to one of claims 6 to 8,~~

~~characterized in that~~

~~the cited new routing is used in order to enable a network to realize a desired internetworking with other networks.~~

~~Abstract~~

~~Signaling system of a signaling point~~

~~The invention is based on the object of indicating a signaling system that enables network tunnels (for example, for the interworking of different signaling systems) in a simple manner. This object is achieved according to the invention using virtual network tunnels.~~

~~New patent claims~~

~~1. Signaling system of a signaling point, that~~

~~– for a received signaling message, determines, on the basis of a network identifier (NID, NI), the identity of the network to which the signaling message belongs,~~

~~– takes, from a routing table belonging to the network identity, items of information for the routing of the signaling message, whereby it accesses the routing table using the signaling point code (DPC) of the signaling message,~~

~~– determines, on the basis of the type of routing information taken from the routing table, whether an item of routing information is present that indicates a link or, respectively, linkset that is to be used for the forwarding of the signaling message, or that denotes a network identifier.~~

~~– again supplies the signaling message to the routing, if the item of routing information taken from the routing table is a network identifier.~~

~~2. Signaling system according to claim 1,~~

~~**characterized in that**~~

~~the cited network identifier of a signaling message is defined by the link or, respectively, linkset via which the signaling message was received.~~

~~3. Signaling system according to claim 1,~~

~~**characterized in that**~~

~~the cited network identifier of a signaling message is indicated in the signaling message itself.~~

~~4. Signaling system according to one of claims 1 to 3,~~

~~**characterized in that**~~

~~with the aid of the cited new routing, the system switches signaling messages between two different signaling systems.~~

~~5. Signaling system according to one of claims 1 to 3,~~

~~**characterized in that**~~

~~with the aid of the cited new routing, the system realizes an internetworking with other networks.~~

~~6. Method for routing, according to which~~

~~– for a received signaling message, the identity of the network to which the signaling message belongs is determined on the basis of a network identifier (NID, NI),~~

~~**AMENDED PAGE**~~

~~– from a routing table belonging to the network identity, items of information are taken for the routing of the signaling message, whereby the routing table is accessed using the signaling point code (DPC) of the signaling message,~~

~~– on the basis of the type of routing information taken from the routing table, it is determined whether an item of routing information is present that indicates a link or, respectively, linkset that is to be used for the forwarding of the signaling message, or that denotes a network identifier,~~

~~– the signaling message is again supplied to the routing if the item of routing information taken from the routing table is a network identifier.~~

~~7. Method for routing according to claim 6,~~

~~**characterized in that**~~

~~the network identifier of a signaling message is defined by the link or, respectively, linkset via which the signaling message was received.~~

~~8. Method for routing according to claim 6,~~

~~**characterized in that**~~

~~the network identifier of a signaling message is indicated in the signaling message itself.~~

~~9. Method according to one of claims 6 to 8,~~

~~**characterized in that**~~

~~the cited new routing is used in order to switch signaling messages between two different signaling systems.~~

~~10. Method according to one of claims 6 to 8,~~

~~**characterized in that**~~

~~the cited new routing is used in order to enable a network to realize a desired internetworking with other networks.~~

Although modifications and changes may be suggested by those skilled in the art to which this invention pertains, it is the intention of the inventor to embody within the patent warranted hereon, all changes and modifications that may reasonably and properly come under the scope of his contribution to the art. - -

~~**AMENDED PAGE**~~

Substitute Specification:

- - SIGNALING SYSTEM OF A SIGNALING POINT

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention generally pertains to signaling systems, and particularly to channel-oriented signaling systems.

Discussion of the Related Art:

Ordinarily, in channel-oriented signaling systems, such as the Signaling System R5, it is possible for a signaling point to communicate with itself or to set up a connection with itself, via a useful channel loop.

However, in Signaling System 7, also called SS7 or ZGS7, this is not possible, although such loops would be advantageous for the solution of a plurality of problems including the interworking of different signaling systems.

For the interworking of different signaling systems, it would be extremely expedient if all signaling systems interwork with a designated signaling system, rather than each signaling system interworking with every other. In addition, technical problems associated with using similar methods, such as incoming linkset/DPC

screening as set forth in protocol Q.705, §8, would also be solved.

In ZGS7, a signaling point is identified by an address, called the signaling point code (SPC). If the signaling point code is used as the destination address, it is also called the destination point code (DPC). If a signaling point designates an originating address, it is called the origination point code (OPC).

In general, level 3 of the message transfer part (MTP) cannot send a message to its own signaling point code or cannot receive a message from itself. Certain users of the MTP, for example TUP and ISUP, also normally cannot send channel-related messages to themselves, even if the MTP were to enable this.

In order to enable such loops, special methods have been implemented that consist essentially of loops specifying signaling channels on which the destination and/or sender address are inverted or complemented. If necessary, similar user-specific modifications must be carried out for users.

A solution to this problem would be to use what are known as physical network tunnels, wherein a link, known as a loop link, is fed back in a loop from a signaling point to the same signaling point, and two different network identities are allocated thereto, one at the input side and the other at the output side.

However, physical tunnels have the disadvantage that their use requires additional hardware, such as the loop links, etc., and messages that must travel through the tunnel experience an additional delay.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a system that makes network tunneling possible.

It is a further object of the invention to provide a system that makes virtual tunneling possible.

It is another object of the invention to provide a system wherein the virtual tunnel considerably reduces additional hardware outlay and time delay without requiring a large development expense.

These and other objects of the invention will become apparent from careful review of the following detailed description of the preferred embodiment, which is to be read in conjunction with study of the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a method according to the present invention;

Figure 2 shows forms of incoming linkset/ DPC screening according to the present invention.

Figure 3 shows an interworking of various signaling systems according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will now be described in detail on the basis of the system ZGS7, also known as Signaling System 7 (SS7). The description assumes a multiple network system that supports 32 MTP networks.

In the ZGS7, a network is identified by an external network indicator NI, which is contained in externally observable messages.

In the messages, two bits are reserved for the NI. Therefore, up to four networks can be distinguished in a node. Although a normal signaling link belongs to only one network, it is possible to sufficiently distinguish the network by allocating individual links

to particular networks. Therefore, the NI is no longer required as a distinguishing feature.

In fact, there are systems already existing or in the planning stages that support more than four (e.g., 8 or 32) signaling networks. A network identity NID is internally allocated to each signaling link or link set, and an NI is externally allocated to each internal network identifier NID. Networks having different internal identity can thereby use the same external NI throughout. Each internal network is thereby completely separated internally from the other networks. This method of the decoupling of the external NI and the internal NID is also applicable to systems that support only four or fewer MTP networks. This design is called the multiple network design.

Existing or planned systems that support the multiple network design normally route MSUs in that, from a routing table, the next link or linkset to the desired destination that is currently to be used is determined. For each internal logical network, there is thereby exactly one table, and the tables of these networks are independent of one another. For these systems, a simple modification of these routing tables is now carried out such that in the routing tables the next path selected can be not only a particular link or linkset but also a different network.

Given an incoming MSU, the system determines the internal network identity

(NID) of the network to which this link or linkset belongs on the basis of the link at which the MSU arrived.

Figure 1 shows this process for an MSU having DPC=131, which is received at a link or linkset belonging to the link or linkset 17.

If the system determines that the MSU must be rerouted, the system selects, on the basis of the DPC of the MSU, a line or row from a routing table belonging to the NID. This line contains the identities, such as numbers, of the possible additional routes, such as links or linksets, and specially designated identities, for example, the numbers -1 to -32, which now represent not links or linksets, but rather, the negative internal NID.

If during routing, such a "route" is recognized, the NID of the MSU is correspondingly modified, and is supplied again to the routing. But this time in the other network, the system again determines on the basis of the DPC of the MSU, whether the SP represents the endpoint for the MSU. If not, the system takes information for the routing of the MSU from a routing table belonging to the NID. As discussed with reference to Figure 1, the entry -12 in the routing table of the NID=3 determines the "tunnel" to the network having NID=12 as the next path for the DPC 131. Also with reference to Figure 1, the SPC belonging to NID=12 is 97, and the next path of the MSU

travels via linkset 14. Thus, network management messages are also routed correspondingly.

With the exception of the production of test traffic and actual physical loops using virtual tunnels, all problems can be solved using the physical tunnels according to the present invention.

Figure 2 shows an example of how certain forms of an incoming linkset/ DPC screening can be solved using the present invention.

The operator of a signaling transfer point (STP) offers SS7, also known as ZGS7, interconnect services to other communication network operators. In the example in Figure 2, these are networks D1, D2, E+, and E2. Other networks may make unlimited use of the STP for SS7 traffic inside their own networks. For traffic between the networks, however, there are the following limitations: E+ and D2 may communicate only with one another and with D1. E2 may communicate only with D1. In order to enforce these agreements, the operator of the STP must be able to prevent unauthorized traffic between the networks. He can accomplish this by terminating the linksets to the different operators internally in different SS7 networks.

As is shown symbolically in Figure 2, the internal networks are then connected by virtual tunnels, in such a way that virtual tunnels are set up only between those

networks for which traffic is permitted. For example, for destinations (DPCs) that belong to the operator E2, no routes are set up in the routing tables for the internal networks 2 and 3, corresponding to D2 and E+. In contrast, for destinations (DPC) in D1, special routes representing the virtual tunnels are for example set up in the routing tables of the internal networks 2, 3 and 4.

The limitation of the permitted traffic need not absolutely be limited only to entire networks. Rather, the routing tables can be constructed such that traffic from E+ is possible only to particular designated destinations in D2 by making no entries in the routing table in the network 3 for destinations in D2 that are not allowed.

In Figure 3, an example an interworking of various signaling systems (R1, R2, ISUP) is shown. An interworking is realized between R1 and ISUP and between R2 and ISUP, but not between R1 and R2. An ISUP is located both in the internal network having NID=1 and in the internal network having NID=2. Externally, both networks use for example the same NI, but use different point codes.

A call between R1 and R2 is routed via the ISUP loop. For this purpose, it is sufficient to correspondingly set up the ZGS7 routing tables in both networks, as well as the routing tables for the call processing, and to construct the required speech bundles for the ISUP loop. The ISUPs of the two internal networks communicate via the virtual tunnel (shown symbolically) between NID=1 and NID=2. A physically looped signaling

link or linkset is therefore not required.

In Figure 3, NID=3 is determined as the internal NID. As the next step, on the basis of the DPC of the MSU, a determination is made whether the SP represents the endpoint for the MSU, such as whether the SPC, which SPC depends on the NID of the SP, agrees with the DPC of the MSU, or whether the MSU must be rerouted. For instance, in Fig. 1, it is the SPC=120 that belongings to NID=3.

A great advantage of the invention is that existing mechanisms (routing tables and multiple networks) can be used, at low expense, in order to provide purely virtual network tunnels, which previously were realized only physically.

The invention can also be used without the multiple network design being supported. However, the problems that can be solved using the tunnel design of the present invention are limited. For example, if the flexible allocation of the external NIs to the internal NIDs is not fully supported, but takes place in 1:1 fashion, then the specified method cannot be used for the incoming linkset / DPC screening. As the number of internal NIDs that are supported, with otherwise flexible mapping of NI to NID becomes fewer, the incoming linkset / DPC screening becomes limited in its flexibility.

Although modifications and changes may be suggested by those skilled in the art to which this invention pertains, it is the intention of the inventor to embody within the

patent warranted hereon, all changes and modifications that may reasonably and properly come under the scope of his contribution to the art. - -

Specification

Signaling system of a signaling point

In channel-oriented signaling systems, for example in the signaling system R5, it is possible for a signaling point to communicate with itself, or, respectively, to set up a connection with itself, via a useful channel loop. In the signaling system no. 7 (called ZGS7 for short in the following), this is not possible. However, such loops are advantageous for the solution of a plurality of problems. For the interworking of different signaling systems, it is a significant simplification in implementation if all signaling systems interwork with a designated signaling system, rather than each signaling system interworking with every other. Another technical problem that can be solved using similar methods is incoming linkset **[or: link set]** / DPC screening (see e.g. Q.705, §8).

In the ZGS7, a signaling point is identified by an address, called the signaling point code (SPC). If the signaling point code is used as the destination address, it is also called the destination point code (DPC). If it designates an originating address, it is called the origination point code (OPC). In general, level 3 of the message transfer part cannot send a message to its own signaling point code, or, respectively, cannot receive a message from itself. Certain users of the message transfer part, for example TUP and ISUP, also normally cannot send channel-related messages to themselves, even if the message transfer part were to enable this. In order nonetheless to enable such loops, special methods have been implemented that consist essentially in the formation of loops by specific signaling channels, on which loops the destination and/or sender address are inverted/complemented. If necessary, similar user-specific modifications must be carried out for users.

Another possible solution for this problem in systems that support the multiple network design (further explained below) would be what are known as physical network tunnels. In order to realize such a physical tunnel, a link (known as a loop link) is fed back in a loop from a signaling point to the same signaling point, and two different network identities are allocated thereto, at the input side and at the output side.

However, physical tunnels have the disadvantage that their use requires additional hardware (loop links, etc.), and messages that must travel through the tunnel experience an additional delay.

The invention is based on the object of indicating a system that makes the network tunnel possible without the cited disadvantages.

This object is achieved by means of a system according to claim 1.

The inventive design of the virtual tunnel considerably reduces additional hardware outlay and time delay, without however requiring a large development expense.

In the following, the invention is explained in more detail with the aid of the drawing, which comprises three figures.

The invention is explained in more detail on the basis of the system ZGS7. In the ZGS7, a network is identified by what is known as an (external) network indicator (NI) that is contained in the externally observable messages. In the messages, two bits are reserved for the NI; therefore, up to four networks can be distinguished in a node. Since normally a signaling link belongs to only one network, it has however come to be recognized that in order to distinguish the network it is sufficient to allocate individual links to particular networks. The NI is therefore no longer required as a distinguishing feature. In fact, there are systems – already existing or in the planning stages – that support more than four (e.g., 8 or 32) signaling networks. A network identity NID (network identifier) is thereby internally allocated to each signaling link, and an NI is externally allocated to each internal network identifier NID. Networks having different internal identity can thereby use the same external NI throughout. Each (internal) network is thereby internally completely separated from the other networks. (This method of the decoupling of the external NI and the internal NID is of course also applicable to systems that support only four or fewer MTP networks). The cited design is called the multiple network design in the following.

Existing or, respectively, planned systems that support the multiple network design normally route MSUs in that, from a table (routing table), the next link(set) to the desired destination that is currently to be used is determined. For each internal (logical) network, there is thereby exactly one table, and the tables of these networks are independent of one another. For these systems, a simple modification of these routing tables is now carried out such that in the routing tables the path **[...]** as the next to be taken can be not only a particular link(set) but also a different network.

As an exemplary embodiment of the invention, a multiple network system that supports 32 MTP networks is assumed.

Given an incoming MSU, the system determines the (internal) network identity (NID) of the network to which this link belongs, on the basis of the link at which the MSU arrived. In Figure 1, this process is shown for an MSU having DPC=131, which is received at a link belonging to the linkset 17. In Figure 3, NID=3 is determined as the internal NID. As the next step, on the basis of the DPC of the MSU it is determined whether the SP represents the endpoint for the MSU, that is, whether the SPC of the SP (SPC depends on the NID; in Fig. 1 it is the SPC=120 belonging to NID=3!) agrees with the DPC of the MSU, or whether the MSU must be rerouted.

If, in the manner described, the system determines that the MSU must be rerouted, the system selects, on the basis of the DPC of the MSU, a line **[or: row]** from a routing table belonging to the NID. This line contains the identities (for example, numbers) of the possible additional routes (that is, linksets), and specially designated identities (for example, the numbers -1 to -32), which now represent not linksets, but rather (the for example negative) internal NID. If during routing such a "route" is recognized (in Figure 1, the entry -12 in the routing table of the NID=3 determines the "tunnel" to the network having NID=12 as the next path for the DPC 131), the NID of the MSU is correspondingly modified, and is supplied again to the routing, but this time in the other network, which means that the system again determines, on the basis of the DPC of the MSU, whether the SP represents the endpoint for the MSU, and, if not, takes information for the routing of the MSU from a routing table belonging to the

NID (see Figure 1; the SPC belonging to NID=12 is 97, and the next path of the MSU travels via linkset 14). Of course, network management messages are also routed correspondingly.

With the exception of the production of test traffic and actual physical loops, using virtual tunnels all problems can be solved that can also be solved using the physical tunnels.

In Figure 2, as an example it is shown how, using the present invention, certain forms, important in practice, of what is known as the incoming linkset / DPC screening can be solved. The operator of a signaling transfer point (STP) offers SS7 interconnect services to other communication network operators. In the example in Figure 2, these are the networks D1, D2, E+ and E2. According to the agreement, the other networks may make unlimited use of the STP for SS7 traffic inside their own networks. For traffic between the networks, however, there are the following limitations: E+ and D2 may communicate only with one another and with D1. E2 may communicate only with D1. In order to enforce these agreements, the operator of the STP must be able to prevent unauthorized traffic between the networks. He can accomplish this by terminating the linksets to the different operators internally in different SS7 networks, as shown symbolically in Figure 1. As is shown symbolically in Figure **[...]**, the internal networks are then connected by virtual tunnels, in such a way that virtual tunnels are set up only between those networks between which traffic is permitted. For example, for destinations (DPC) that belong to the operator E2, no routes are set up in the routing tables for the internal networks 2 and 3 (corresponding to D2 and E+). In contrast, for destinations (DPC) in D1, special routes representing the virtual tunnels are for example set up in the routing tables of the internal networks 2, 3 and 4.

It is to be noted that the limitation of the permitted traffic need not absolutely be limited only to entire **[or: overall]** networks. Rather, the routing tables can be constructed such that, for example, traffic from E+ is possible only to particular designated destinations in D2, by making no entries in the routing table in the network 3 for destinations in D2 that are not allowed.

In Figure 3, as an example an interworking of various signaling systems (R1, R2, ISUP) is described. An interworking is realized between R1 and ISUP and between R2 and ISUP, but not between R1 and R2. An ISUP is located both in the internal network having NID=1 and in the internal network having NID=2. Externally, both networks use for example the same NI, but use different point codes.

A call between R1 and R2 is routed via the ISUP loop. For this purpose, it is sufficient to correspondingly set up the ZGS7 routing tables in both networks, as well as the routing tables for the call processing, and to construct the required speech bundles for the ISUP loop. The ISUPs of the two internal networks communicate via the virtual tunnel (shown symbolically) between NID=1 and NID=2. A physically looped signaling link is therefore not required.

A great advantage of the invention is that existing mechanisms (routing tables and multiple networks) can be used, at low expense, in order to provide purely virtual network tunnels, which previously were realized only physically.

The invention can also be used without the multiple network design being supported, but in this case the problems of application that can be solved using the tunnel design are limited. If, for example, the flexible allocation of the external NIs to the internal NIDs is not supported, but rather this takes place in 1:1 fashion, then the specified method cannot be used for the incoming linkset / DPC screening. As the number of internal NIDs that are supported, with otherwise flexible mapping of NI to NID, becomes fewer, the incoming linkset / DPC screening becomes more limited in its flexibility.

New patent claims

1. Signaling system of a signaling point, that
– for a received signaling message, determines, on the basis of a network identifier (NID, NI), the identity of the network to which the signaling message belongs,
– takes, from a routing table belonging to the network identity, items of information for the routing of the signaling message, whereby it accesses the routing table using the signaling point code (DPC) of the signaling message,
– determines, on the basis of the type of routing information taken from the routing table, whether an item of routing information is present that indicates a link or, respectively, linkset that is to be used for the forwarding of the signaling message, or that denotes a network identifier,
– again supplies the signaling message to the routing, if the item of routing information taken from the routing table is a network identifier.

2. Signaling system according to claim 1,
characterized in that
the cited network identifier of a signaling message is defined by the link or, respectively, linkset via which the signaling message was received.

3. Signaling system according to claim 1,
characterized in that
the cited network identifier of a signaling message is indicated in the signaling message itself.

4. Signaling system according to one of claims 1 to 3,
characterized in that
with the aid of the cited new routing, the system switches signaling messages between two different signaling systems.

5. Signaling system according to one of claims 1 to 3,
characterized in that

with the aid of the cited new routing, the system realizes an internetworking with other networks.

6. Method for routing, according to which

– for a received signaling message, the identity of the network to which the signaling message belongs is determined on the basis of a network identifier (NID, NI),

– from a routing table belonging to the network identity, items of information are taken for the routing of the signaling message, whereby the routing table is accessed using the signaling point code (DPC) of the signaling message,

– on the basis of the type of routing information taken from the routing table, it is determined whether an item of routing information is present that indicates a link or, respectively, linkset that is to be used for the forwarding of the signaling message, or that denotes a network identifier,

– the signaling message is again supplied to the routing if the item of routing information taken from the routing table is a network identifier.

7. Method for routing according to claim 6,

characterized in that

the network identifier of a signaling message is defined by the link or, respectively, linkset via which the signaling message was received.

8. Method for routing according to claim 6,

characterized in that

the network identifier of a signaling message is indicated in the signaling message itself.

9. Method according to one of claims 6 to 8,

characterized in that

the cited new routing is used in order to switch signaling messages between two different signaling systems.

10. Method according to one of claims 6 to 8,

characterized in that

the cited new routing is used in order to enable a network to realize a desired internetworking with other networks.

Abstract

Signaling system of a signaling point

The invention is based on the object of indicating a signaling system that enables network tunnels (for example, for the interworking of different signaling systems) in a simple manner. This object is achieved according to the invention using virtual network tunnels.

FIG 1 - Exemplary Routing with Virtual Tunnels

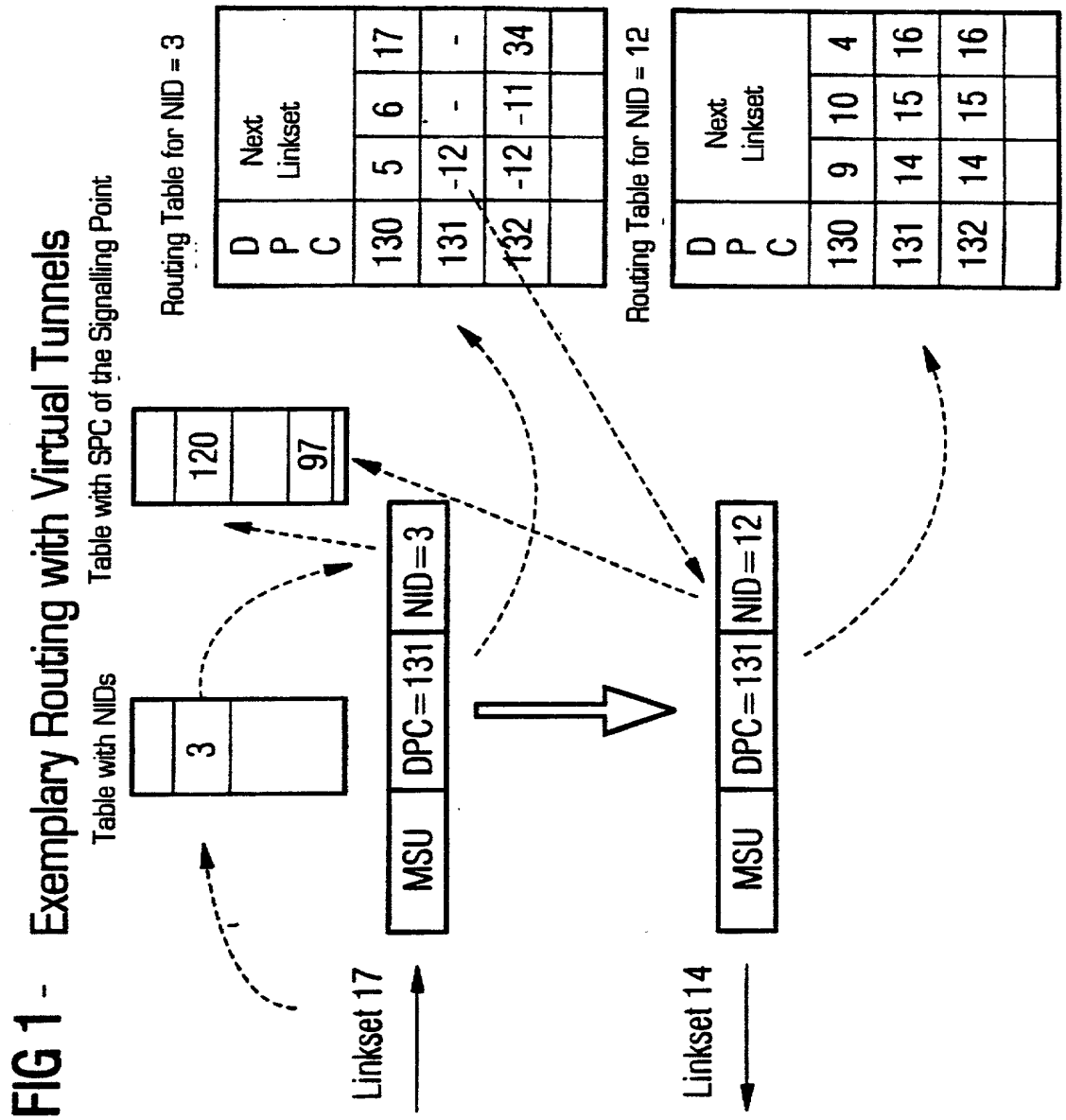
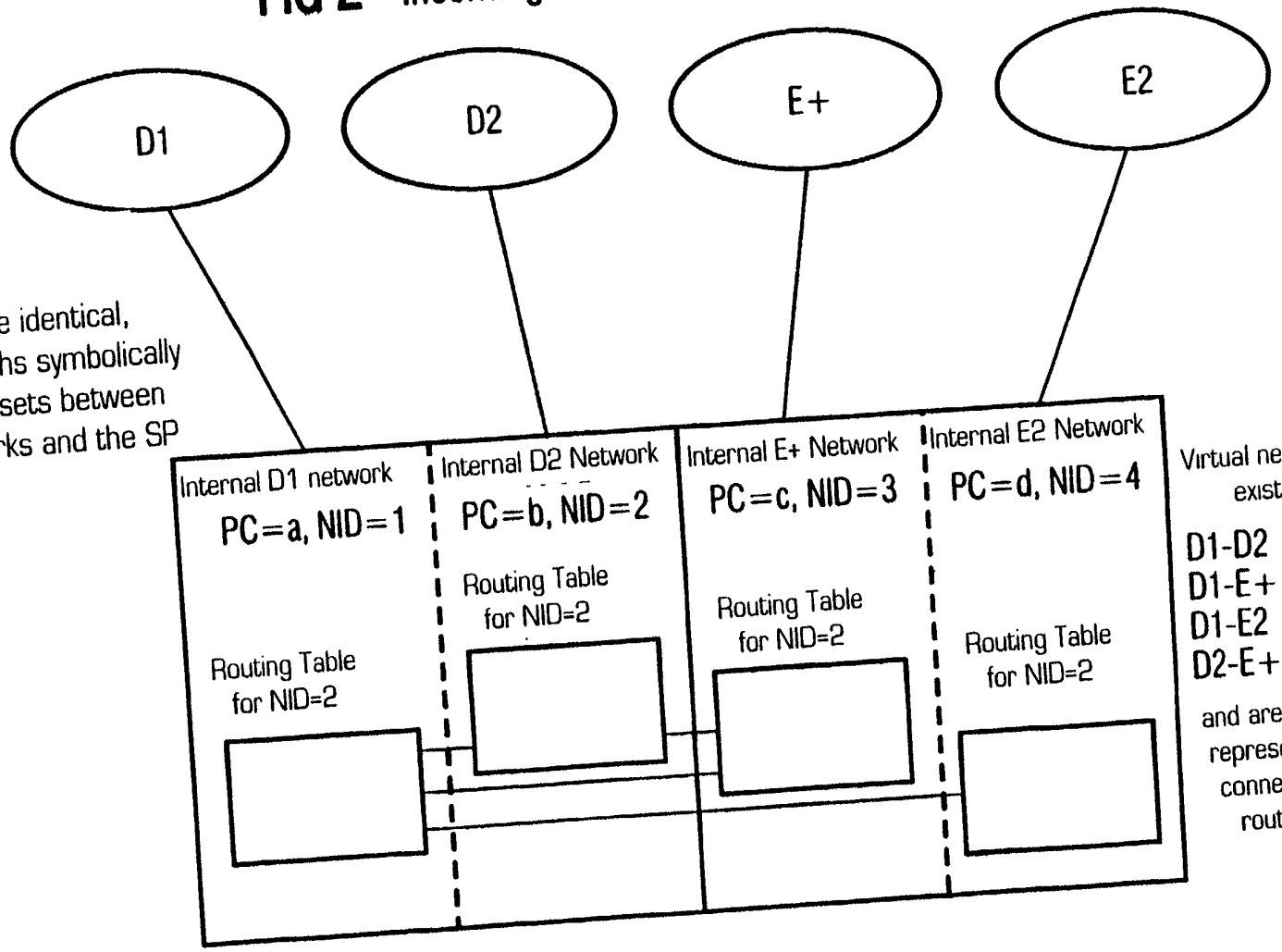


FIG 2 - Incoming Linkset/DPC Screening



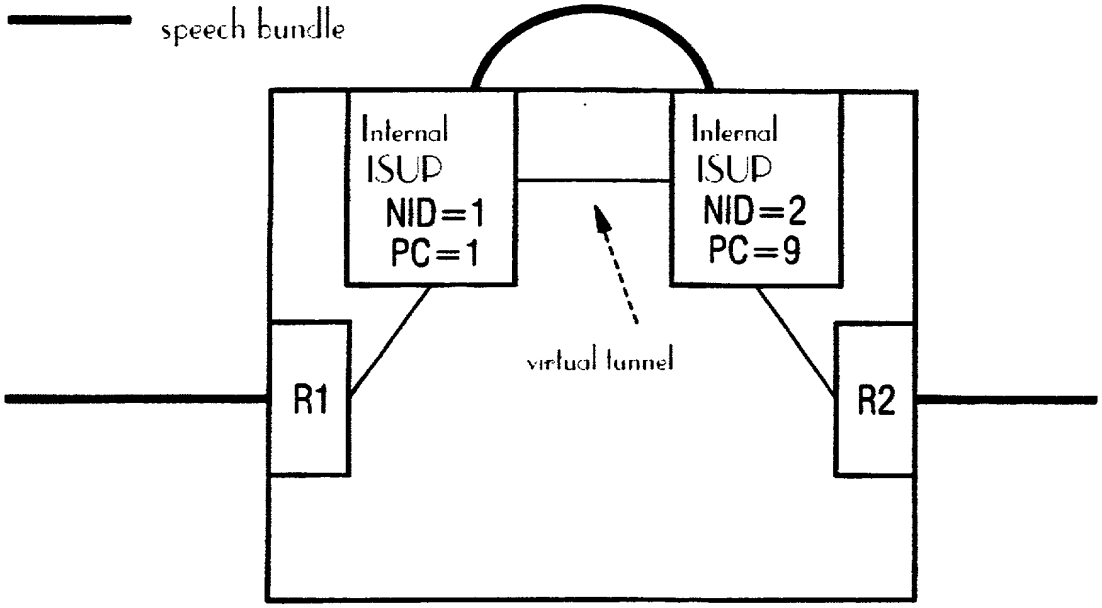
All external NI are identical, the indicated paths symbolically represent all linksets between the other networks and the SP

Virtual network tunnels exist between

D1-D2
D1-E+
D1-E2
D2-E+

and are symbolically represented by the connection of the routing tables

FIG 3 - Interworking of R1 and R2 via ISUP



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UNDER THE PATENT COOPERATION TREATY-CHAPTER II

CHANGE OF ADDRESS OF APPLICANTS' REPRESENTATIVE

APPLICANT(S):	GRADISCHNIG, K.
ATTORNEY DOCKET NO.:	P01,0071
INTERNATIONAL APPLICATION NO:	PCT/EP99/06239
INTERNATIONAL FILING DATE:	25 AUG 1999
INVENTION:	SIGNALING SYSTEM OF A SIGNALING POINT

Assistant Commissioner for Patents,
Washington D.C. 20231

S I R:

Members of the firm of Hill & Simpson designated on the original Power of Attorney have merged into the firm of Schiff Hardin & Waite. All future correspondence for the above-referenced application therefore should be sent to the following address:

SCHIFF HARDIN & WAITE
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6473

CUSTOMER NUMBER 26574

Submitted by,

Steven H. Noll (Reg. No. 28,982)

Steven H. Noll
SCHIFF HARDIN & WAITE
Patent Department
6600 Sears Tower
Chicago, Illinois 60606-6473
Telephone: (312) 258-5779
Attorneys for Applicants
CUSTOMER NUMBER 26574

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

SIGNALISIERUNGSSYSTEM EINES SIGNALISIERUNGSPUNKTES

deren Beschreibung

(zutreffendjhaes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als
PCT internationale Anmeldung
PCT Anmeldungsnummer _____
Eingereicht wurde und am _____
Abgeandert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

_____

_____

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as
PCT international application
PCT Application No. _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
98116018.7	Germany(EP)	25. August 1998	☒	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

Telefongespräche bitte richten an: *(Name und Telefonnummer)*

Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:	Full name of sole or first inventor:
GRADISCHNIG, Klaus David	
Unterschrift des Erfinders Datum	Inventor's signature Date
17.9.1999	
Wohnsitz	Residence
D-82131 Gauting, Germany DEX	
Staatsangehörigkeit	Citizenship
Österreich	
Postanschrift	Post Office Addess
Max-Klinger-Str. 28	
D-82131 Gauting Bundesrepublik Deutschland	
Voller Name des zweiten Miterfinders (falls zutreffend).	Full name of second joint inventor, if any:
Unterschrift des Erfinders Datum	Second Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).